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ARROWHEAD

COMBAT DEVELOPMENTS COMMAND

10th Anniversary

United States Army
Combat Developments Command

A DECADE OF VISION AND PROGRESS

June 1972

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Commander's Call

A DECADE OF VISION AND PROGRESS

On our tenth anniversary I congratulate the members of this command, past and present, who have contributed so much to the betterment of the Army. The military and civilian members of our combat developments team can look with pride at a decade in which a great deal of innovative and dedicated work has honored the motto, "Vision to Victory."

The life span of Combat Developments Command has coincided with the tremendous battlefield effort our Army has made in Vietnam. The Soldier of that war has always received our first priority. In addition, the command has been a key force in all the major innovations of the past ten years, including the airmobile division, the armed helicopter, the integrated battlefield control system, and other major improvements in firepower, air defense, intelligence, logistics, and personnel support systems.

To the veterans and new arrivals of Combat Developments Command, I wish to extend my personal gratitude for all your efforts to create the kind of concepts, doctrine, organizations, and equipment that will continue to provide our Nation with the finest possible combat ready Army and conserve the lives of our fighting Soldiers.

John Norton

JOHN NORTON
Lieutenant General,
U.S. Army
Commanding

June 1972 No. 40

UNITED STATES ARMY
THE CHIEF OF STAFF

TO THE MEMBERS OF THE
UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND

On the occasion of the tenth anniversary of the United States Army Combat Developments Command, I send to each of its members the hearty congratulations of the men and women of the United States Army.

In a decade of outstanding accomplishment since its establishment on 20 June 1962, the Combat Developments Command has contributed significantly to the Army's capabilities. Through bold new concepts, doctrines, and tactics, you have kept the Army abreast of scientific and technological advances, ensuring its ability to provide for our Nation's security.

I salute you for your many achievements and join all members of the Army in expressing pride in the professionalism with which you have met all challenges.

W C Westmoreland
W. C. WESTMORELAND
General, United States Army
Chief of Staff

ABOUT THE COVER

FRONT: The front cover, designed by CDC Graphic Arts Department, numerically represents CDC from its birth through its Tenth Anniversary.

PICTURE CREDITS: Page 27, Godek; All other photos U.S. Army Photos.

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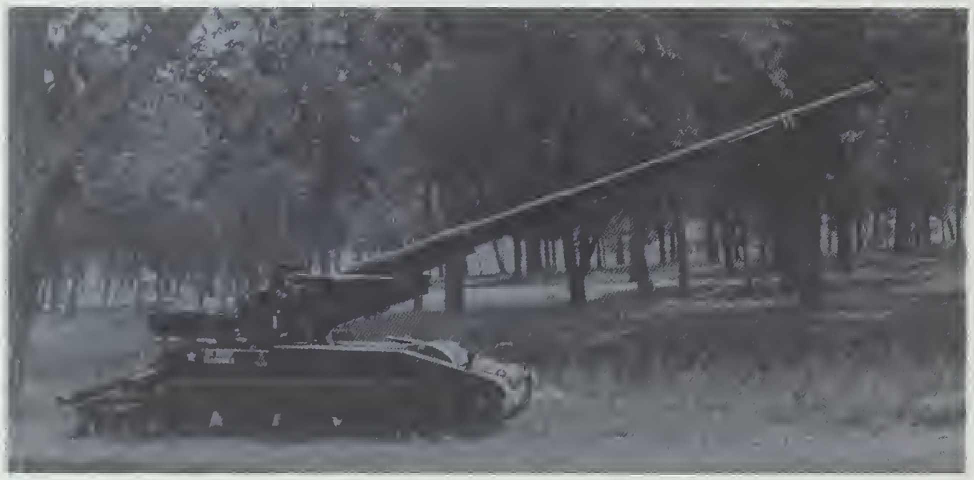
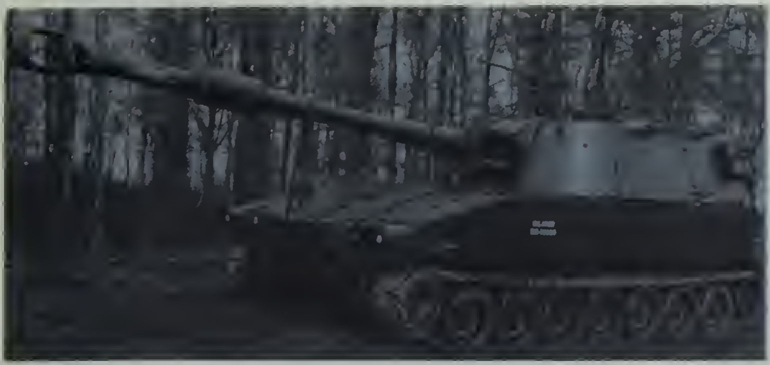
A Decade of Progress

Editors Note: This month the *Arrowhead* has changed its format slightly so that we could present to our readers a picture of CDC throughout the past ten years. CDC celebrates its tenth anniversary on 20 June and it seemed appropriate that the *Arrowhead* show, through pictures and copy, just what has been accomplished over the past ten years. On the following pages appears the input from the Headquarters, Groups and Agencies throughout CDC on what they believe to be the major achievements of their organizations during the past decade.

ARTILLERY

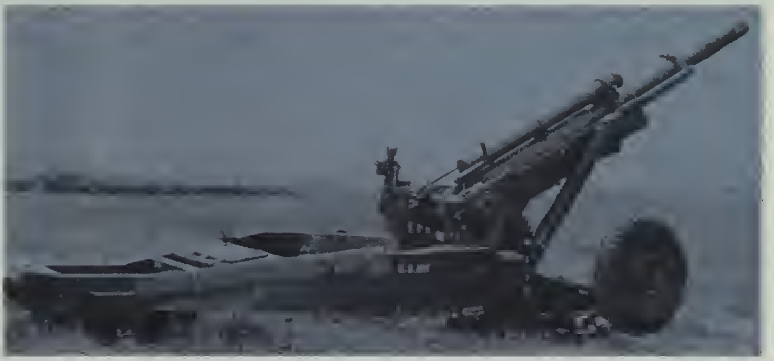


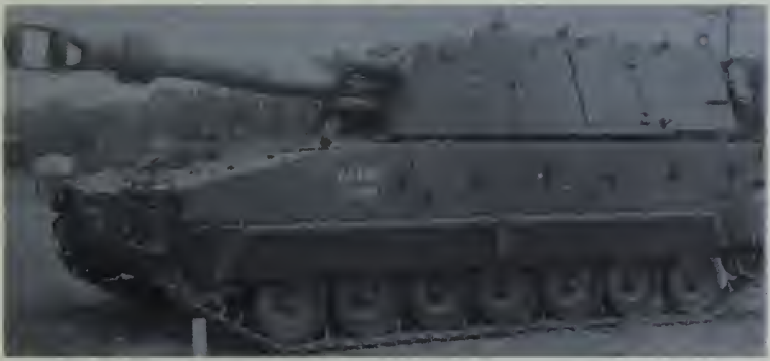
M107. The M107 is a 175mm gun, full-tracked, highly mobile and maneuverable, SP weapon. It is designed to provide general artillery support to ground troops and close general support to armored forces. Enter inventory & fielded 1963.



M109A1. The 109A1 is an improved version of the M109 employing a new tube and other components to accommodate the tube thereby increasing the maximum range. It is used primarily in armored & armored infantry units. Enter inventory 1972.

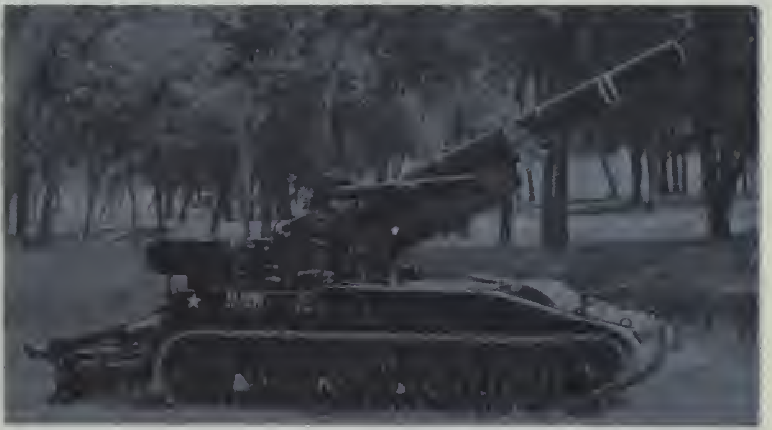
M102. The M102 is a light, towed 105mm howitzer used primarily in airborne divisions, separate airborne brigades, separate light infantry brigades, and airmobile division. Enter inventory & fielded 1965.





M109. The M109 is a full-tracked, armored, air transportable, amphibious 155mm SP howitzer used primarily in armored and armored infantry units. Enter inventory & fielded 1963.

M110. The M110 is an 8–inch howitzer, full-tracked, highly mobile and maneuverable, SP weapon. It is designed to provide general artillery support to ground troops and close general support to armored forces. Enter inventory & fielded 1963.



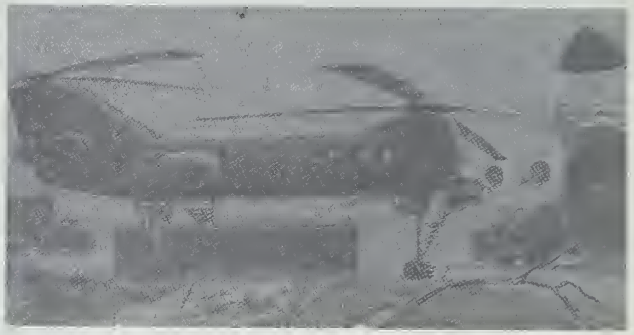
AVIATION

Over the past 10 years, the Aviation Agency produced requirements for three major aircraft systems—the AH-56, UTTAS, and HLH. Initial development and documentation of a requirement for an armed helicopter weapons system led to a family of subsystems and standard external racks. Further research led to a requirement for a "pure" aerial weapons system. The Huey Cobra was procured as an interim system, but will be replaced by a "pure" attack helicopter.

The AH–56 (Cheyenne) is one contender.

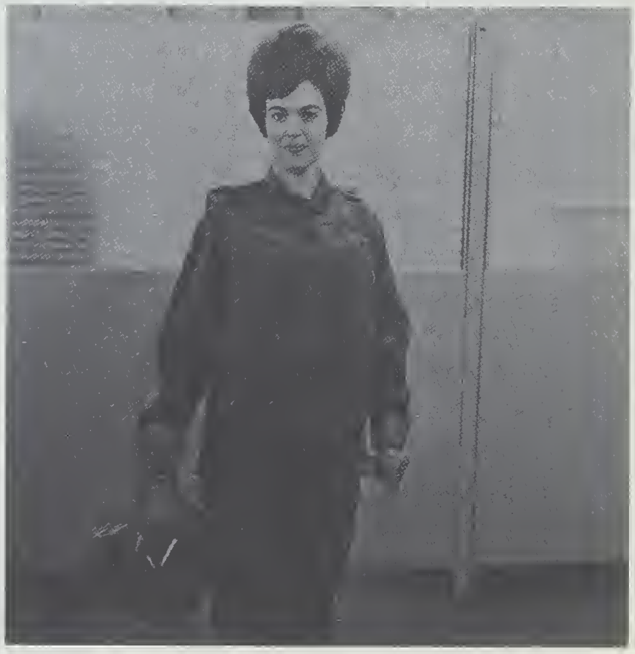
In 1966, the Agency began documenting the materiel need (MN) for a Utility Tactical Transport Aircraft System (UTTAS) to replace the Huey fleet. This system went through the full concept formulation process, and was the first conducted under the life cycle management model. All portions of the system were compared against DOD competing systems.

Presently, the Agency is conducting concept formulation on the Heavy Lift Helicopter. The helicopter will be a new addition to the Army inventory. The MN has been approved, and contracts for components have been let.



The Heavy Lift Helicopter

In addition, the Agency documented requirements for new items of equipment for life and ground support and avionics systems. The Agency has also provided user input to product improvement programs for existing aircraft and associated equipment.



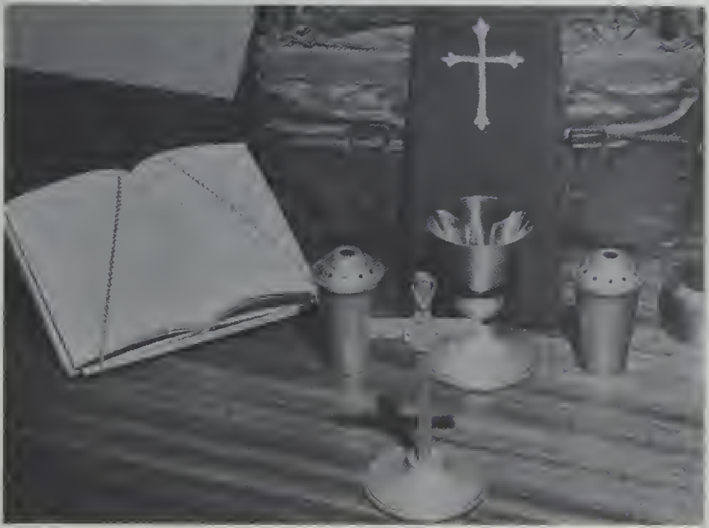
The SPH–4 Flight Helmet, NOMEX Flight Suit and Gloves, and the Aircrewman Protective Armor Vest

CHAPLAIN

This Musical Worship Aid for Religious Services in the Field will replace the Field Organ.

A field organ set up.

A new musical worship aid compared with the field organ.

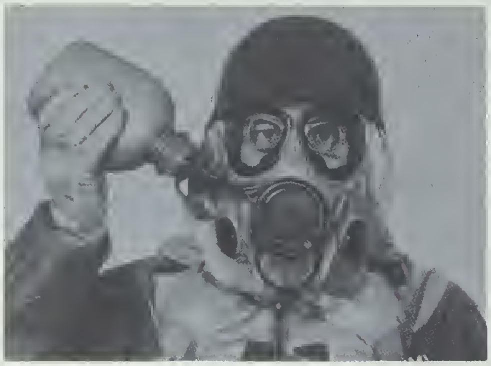


This type Chaplain Kit, Combat, was utilized in Vietnam and is still in use.

CBR

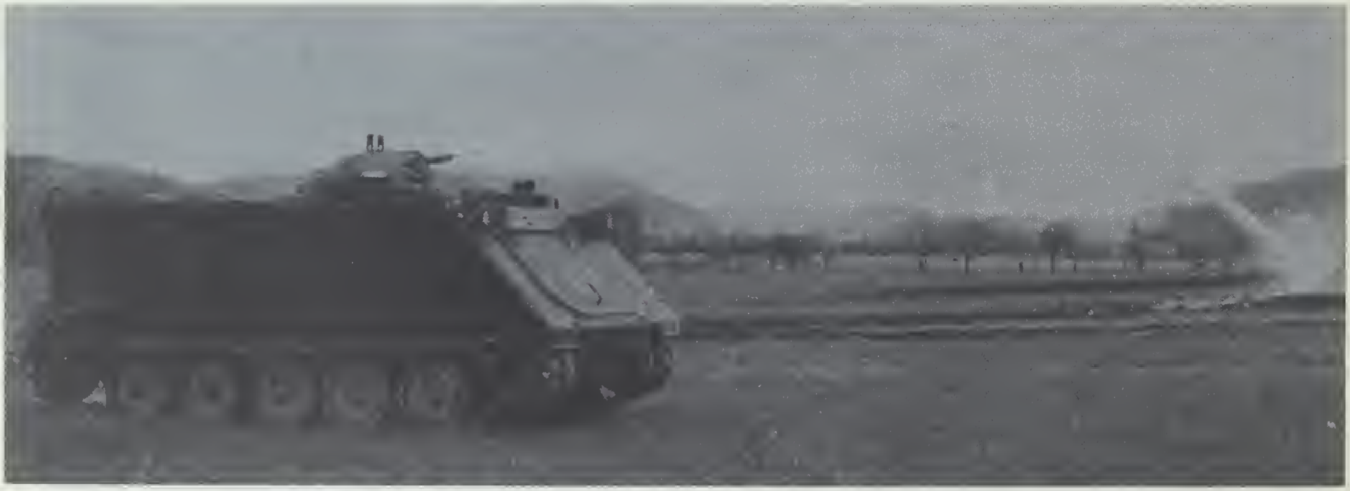
During its brief history the CBRA, located at Ft. McClellan, Ala., has continued the tradition of the Chemical Corps by continually improving the nation's defense against chemical and biological warfare. A test of the Army's Mission Effectiveness in a Toxic Environment (METOXE) demonstrated the need for improved doctrine and supporting equipment for chemical and biological defense. This need was filled by the CBRA-developed Mission Oriented Protective Posture (MOPP) doctrine and by the resulting development of improved defensive equipment. Materiel developments which occurred as a result of this improved doctrine include the improved protective mask (M17A1), the field of collective protection including the XM51 protective shelter and the introduction of the Automatic Chemical Agent Alarm System.

New concepts and doctrine for the use of time honored smoke and flame have also been forthcoming. Significant organizational and materiel developments in this area include the development of the Chemical Mechanized Flame Company and the development of the new portable flame weapon - the M202 flame rocket launcher.



MASK, CBR: FIELD M17A1

The M17A1 protective mask provides the wearer with the ability to drink through the mask's self-contained drinking system (being demonstrated) without the necessity of unmasking. The mask also has an accessory resuscitation tube which allows the masked soldier to give mouth-to-mouth artificial respiration to an individual casualty in a contaminated area. The improved mask significantly enhances the effectiveness of the Mission Oriented Protective Posture (MOPP) doctrine developed by the CBRA.



M132 MECHANIZED FLAMETHROWER

The Chemical Mechanized Flame Company (TOE 3–357), developed by the CBRA and equipped with the M132 mechanized flamethrower, provides a new means of direct fire support to the combat commander. The new company combines the long-recognized benefits of flame and the mobility of a lightly-armored tracked vehicle in a highly flexible organization to provide another useful source of combat power available to the ground commander.

AUTOMATIC CHEMICAL AGENT ALARM SYSTEM

The M43 Detector Unit (shown) is the heart of the Automatic Chemical Agent Alarm System. The System provides field commanders with a means of continually monitoring for the presence of toxic chemical agents. This system fills a long empty gap in defense against chemical agents.

M202 FLAME ROCKET LAUNCHER

The M202 launcher has introduced a new chapter in the long history of flame warfare. Its relatively longer range and pinpoint accuracy on point targets combine to overcome the disadvantages of its predecessor—the portable flame thrower. The M202 launcher with its rapid-fire, multi-shot capability is yet another weapon in the arsenal available to the infantryman.

CDEC

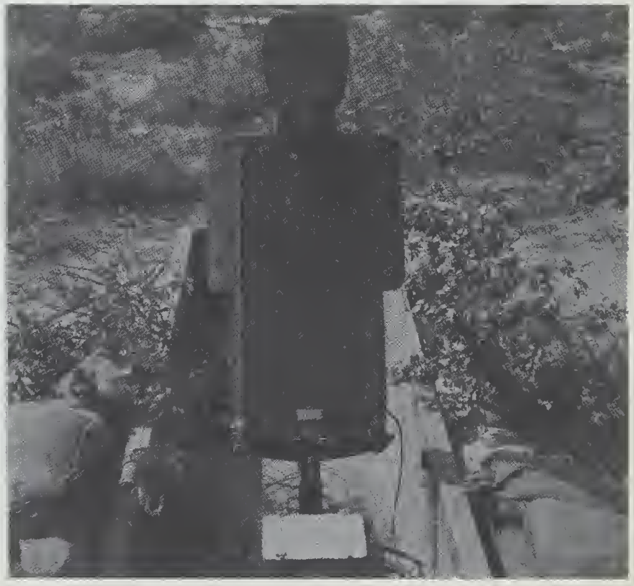
How the Army of the future will fight . . . how it will be equipped and organized . . . in order to assure victory and survival in the field are questions examined by experimentation conducted by the Army Combat Developments Experimentation Command which is headquartered at Ft. Ord.

CDEC has been in existence since 1956 and during the last ten years on which the spotlight is turned in this issue of THE ARROWHEAD. many vital and interesting experiments have taken place on its vast and rugged field laboratory on Hunter Liggett Military Reservation, 55 air miles south of its Ft. Ord headquarters. Among these are the following . . . .

TOXIC ENVIRONMENT. During 1963, the ROAD Battalion Operations in a Toxic Environment experiment took place and the data generated by this experiment evaluated the effects imposed by a continuous toxic chemical environment on the operational capabilities of a reinforced ROAD infantry and mechanized infantry battalion whose personnel wore standard chemical protective clothing and equipment. Ft.

Ord's training ranges were used . . . and Hunter Liggett . . . and one phase was conducted in Panama to measure the effects of a hot-humid environment. (A side experiment, "Toxic-Free Shelter", was also conducted) Special protective clothing was worn by CDEC Experimentation Soldiers to include protective masks and gloves which gave the CDEC soldier the look of an astronaut and brought to light some interesting data on his performance of duty under difficult environmental conditions. The salient conclusions and recommendations of this field work portrayed the effects on operations caused by wearing of chemical protective clothing and equipment; the lengths of time units can endure in toxic environments in varying temperature ranges while performing different physical activities, proposals concerning equipment modifications, doctrine and training, and, proposed distribution of chemical protective equipment.

IRUS. Infantry Rifle Unit Study (IRUS) was a project of CDEC's Project Team II back in 1966, a development of concepts, doctrine and determination of optimum organization of Army small combat units—the squad and the platoon—and used highly complex computer-operated infantry target ranges which portrayed seven realistic combat situations and featured the pop-up electronic target such as the one below. There and three sizes and shapes—full size, head-and-shoulders size and waist-high, which rose or ducked down again into "fox holes" giving realism to the combat Soldier. For further realism, the weapons fire simulator with which it is equipped, fires back! It has the noise and flash of real gunfire and has been programmed to simulate rifle, automatic or automatic machinegun fire. Typical combat situations were possible during these experiments ranging from approach to contact and assault of a well dug-in enemy to repelling a daylight and night time assault by an aggressor force. An IBM computer registered the hits, misses and other data collected from the various target sites on the ranges; and data obtained by CDEC in this experiment helped provide military planners with information necessary to determine the optimum size and weapons mix of infantry units of tomorrow.



AIRCRAFT SURVIVABILITY. Major emphasis at CDEC for the past nine years has been placed on Aircraft Survivability. A series of interrelated field experiments have produced important data concerning the vulnerability of Army aircraft in low, mid and high intensity warfare. Three major field experiments were: VISCON (Army Aircraft Surviability against Visually-sighted Weapons); RACON (Army Aircraft Survivability Radar-Controlled Weapons Experiment) which concerned lethality probabilities of Forward Area Radar-Controller Air Defense Weapons against Army Aircraft; and the UH-1B/M32 Weapons System Experiment. Included were live firing and extensive computer modeling as well as field maneuvers. Knowledge gained from these experiments was applied successfully in Vietnam. This particular series was completed in June 1966.

VTOL III. In 1968, Team IV completed the CH-47 Helicopter (Chinook) Man-Machine-Environment Capability experiment—short title, VTOL III. This experiment was designed to determine for a heavy helicopter nap-of-the-earth flight data for various speeds and over various types of terrain. Aircraft exposure time-to-ground observation was also measured. It sought answers to two questions: What is the average altitude above ground level which can be flown over different types of terrain at various air speeds? How long can the Chinook be heard and seen by a ground observer with each airspeed and terrain conditions? Above is a view of the "grass hopping" of the big Chinook as it flew nap-of-the-earth over the flat terrain course, while a CDEC ground observer team recorded the data. A radio altimeter measured altitude above ground level and an oscillograph to which all instrumentation was linked, recorded simultaneously all measurements taken. A pilot point-of-view camera was also mounted in the Chinook for documentary film purposes.

THE DFS . . . or Direct Fire Simulator experiment allowed a Soldier to fire a harmless laser beam from a rifle and see instantly whether or not he scored a "hit" or a "kill." Every time a Soldier pulled the trigger, the laser transmitter would send out a beam of light on the same trajectory a live round would travel. This beam would be picked up on one of eight detectors on the target. The Detector would then convert the code that is carried by the beam into coded current pulses and, by using the RMS-2 transmitter (which the soldier carries on his back) relay it to a central computer system. In a fraction of a second, the computer determined who fired the shot, who was hit and whether or not there was a "kill." The computer informed the Soldier-target that he had been hit by setting off a buzzer in his helmet. The DFS system was extended to aircraft and air-to-ground combat later, in order to make wargames more accurate and valuable.

COMS GP

Combat Systems Group was activated as the Combined Arms Group on 2 July 1962. During the decade that followed, the mission of the Group has expanded to encompass the responsibility for developing doctrine, organizations, equipment, and tactics for combat and combat support forces up through division level.

The increased mission has caused COMS to grow from its original complement of 65 military and civilian personnel to its present strength of over 200. With eight subordinate agencies, COMS Group faces the challenging task of synthesizing a myriad of independent actions into effective systems for divisional forces. These actions must be coordinated with the sister groups within CDC to ensure the complete integration of future systems.

Among its major developments COMS Group can cite the TOW anti-tank missile and the study to design new divisions (CONFAD). At the same time we must acknowledge the invaluable contributions made by our sister groups and others within the combat development community.

Grounded in reality with an eye to the future, COMS Group views the 10th Anniversary of CDC, not only as a milestone, but as a stepping stone to the future.

Comm-Elec

Tactical communicators must provide responsive communications support to assure success of combat operations. Toward this end, the major accomplishment of ten years of effort by the Communications-Electronics Agency has been a positive change from a piece-meal equipment approach to a systems engineering approach in the development of communications concepts.

The communications systems engineering approach is exemplified by the conduct of major, comprehensive conceptual and doctrinal studies which permit time-phased and coherent development, evaluation, and fielding of materiel and organizations for elements of the Army in the Field. Timely consideration of threats, battlefield environments, operational and organizational concepts, and traffic demands assure that the resulting tactical communications systems will provide area coverage for all combat users, in accordance with variations in priorities and required levels of responsiveness.

Several major communications systems studies conducted from 1963 - 1967 were established as the basis for Army tactical communications through 1975. Currently, a comprehensive ongoing study entitled Integrated Tactical Communications Systems is designed to set forth the systems concept and doctrine for the period 1976 - 1990.

CONFOR

In August of 1971, a broad reorganization of the entire Combat Developments Command was executed and the Concepts and Force Design Group was established. The headquarters for CONFOR Gp is located in Alexandria, Virginia with subordinate agencies of the Nuclear Agency at Ft. Bliss, Tex., and the Special Operations Agency at Ft. Bragg, N.C.

CONFOR Group was formerly the Institute of Land Combat, an agency established in March 1967 and tasked exclusively with the preparation of the Land Combat System Study. The reorganization of CDC, impacted on CONFOR Group in two major areas: The first was to greatly enlarge the Group's timeframe responsibility. Whereas the ILC timeframe was restricted to only the long range period, the CONFOR Group's timeframe has been extended to include the mid and short range as well as the long range timeframe. Secondly, ILC's responsibilities were centered exclusively on the preparation of the Land Combat System Study, a project involved with the design of the Army in the Field for 20 years in the future. By contrast, CONFOR Group while continuing its responsibilities for Land Combat System has received many additional responsibilities. The expanded CONFOR Gp continues the former concept design responsibilities but now adds doctrine, force design, materiel needs and proponency for doctrinal literature above division level.

Typical of some of the new functions assumed by the Group are: technical nuclear considerations, stability and special operations, air space management, amphibious and riverine operations, tactical air support, joint air defense naval gunfire support, concept and force design, and strategic mobility.

Although a relatively new organization, Concepts and Force Design Group has accomplished much in its short history and will continue to move forward in the development of the best Army in the Field for the future. Presently progress is being made on many projects. One of the major efforts is the development of the Conceptual Design for the Army in the Field (CODAF) 1967-1982: The Group's Evaluation Directorate is putting emphasis on a "Jiffy" wargaming project which develops the capability to conduct war games, simulations, and other forms of analyses related to force design. A major study on the conceptual design for Echelons Above Division (EAD) is being carried out by the Directorate of Concepts, Doctrine and Force Design. Also the final actions are being taken on the Land Combat System Study (LCS-I).

ENGINEER

Soldiers clear a road using the new light weight transistorized mine detector.

. . . TRICAP Division, Land Clearing Company, Heavy Division, Light Division, Atomic Demolition Teams, Airmobile Division, Construction Battalion, Airborne Light Equipment Company. . . . Airmobile Dozer, Ribbon Bridge, Combat Engineer Vehicle, Rome Plow, 100 foot Armored Vehicle Launched Bridge, New Mine Dectector, 20 ton Rough Terrain Crane, Well Drilling Rigs, Family of Engineer Construction Equipment, Airmobile Water Purification Equipment, Turbine Powered Generator Family, Medium Girder Bridge . . .

. . . E Series, F Series, G Series, H Series TOE . . . . . Bridging for the Future Army, Geographic Intelligence for the Army, Family of Scatterable Mines, Mine/Countermine Doctrine, Engineer Equipment Manpower Authorization Criteria, Camouflage Requirements, Engineer Support for the Field Army, Base Development, International Standardization . . .

These are a few of the ideas, concepts and requirements for equipment provided by the Engineer Agency to increase the versatility, diversity and response of engineer units to support the Army in the Field.

INFANTRY

A crew practices a simulated TOW missile firing.

The new plastic one-quart canteen has reduced procurement cost to 26 cents per item, while reducing maintenance time and increasing service life.

The starlight scope can be mounted on a variety of weapons including the 90mm recoilless rifle.

INTELLIGENCE

This month the United States Army Combat Developments Command will celebrate its 10th anniversary. The Intelligence Agency at Ft. Huachuca will also celebrate its 10th year as a subordinate organization of the command. The agency, commanded by COL George W. Peterson, was relocated at Ft. Huachua from Ft. Holabird, Md., during 1971.

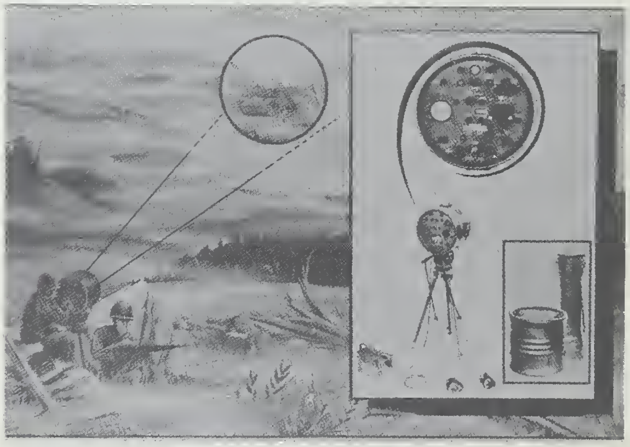
The primary mission of the Intelligence Agency (INTA) is to develop the necessary doctrine, organization, and materiel requirements to structure the military intelligence support system (less ASA) for the Army in the Field. As a secondary mission,, INTA provides intelligence support to other CDC elements as directed by its higher headquarters. In accomplishing its missions INTA is faced with providing the Army—today's and tomorrow's—with proper guidance in the areas of intelligence doctrine, hardware, and concepts.

INTA is tasked with developing concepts as a basis for meeting the intelligence needs for the Army in the Field, producing tables of organization and equipment (TOEs), writing and reviewing Army Field Manuals dealing with military intelligence, and writing materiel needs for necessary intelligence hardware. INTA also has the proponency for weather within Combat Developments Command. The Army's ability to collect information far exceeds its ability to process it into intelligence. INTA is constantly working on new systems and techniques to increase the Army's capability to process and analyze a greater amount of intelligence in a shorter period of time.

The Intelligence Agency is dedicated to seeking new ways to assist the tactical commander to recognize and evaluate the enemy threat in a more timely and accurate manner.

INCS GP

A major reorganization of Combat Developments Command resulted in the formation of the Intelligence and Control Systems Group on 15 April 1971. Under the guidance of BG Edward F. Gudgel, Jr., who took command on 22 February and was promoted to his present rank on 26 February, the Group reorganized from the Combat Support Group into its present organization. As the name indicates, the new mission involves activities relating to intelligence concepts and organizations, and improvements in the areas of command and control. Additionally, the Group is responsible for communications-electronic support to the Army in the field. Although much of the work done at INCS is oriented to the mid and long range time frames (1976 and beyond), many of the concepts and equipment items are presently in the hands of the user—the individual Soldier and his commander. Pictured below are only a few of these many items.



Pictured above is one of the many radar detection systems developed by CDC to increase the surveillance and target acquisition capablities of the US Army. The primary mission of this radar is to detect, locate, and identify moving ground targets such as personnel and vehicles with sufficient accuracy to produce meaningful combat intelligence. The secondary mission of such equipment is to locate targets with sufficient accuracy to permit accurate fires to be placed on the target. Radar systems are continuously being evaluated to insure that the latest techniques and advances are employed to assist the intelligence gathering mission.

The objective of TACFIRE is to increase the effectiveness of field artillery fire support through better fire planning and control, better and more rapid use of intelligence and target information, reduced reaction time, and greater efficiency in the determination of fire capabilities, optimum use of meteorological data, increased control of artillery communications, and speedier allocations of fire units to targets. In this computerized system, the forward observer sends a fire mission to a master computer which includes in its data bank information relating to survey, meteorology, and characteristics of each artillery tube. The information is transmitted instantaneously to the artillery commander and to the artillery batteries where the data is placed on the guns. The system, to be fielded beginning in 1975, is limited only by the speed of the users.

The above represents only a portion of the activities of the Intelligence and Control Systems Group. Other major programs on which the Group has been working during its brief existence include the Tactical Operations System (TOS), the Combat Service Support System (CS3), and the Integrated Battlefield Control System (IBCS).

TOS is an information processing system designed to increase combat effectiveness by aiding commanders in the conduct of combat operations. The hardware consists of computers, display devices, analysis consoles, message input/output devices, and hardcopy printers. The system, which has had a high priority within INCS Group, is scheduled for initiation of testing in fourth quarter, FY 74.

CS3 is a data processing system utilizing data communications designed to provide unit commanders with data to support operational decisions based on the optimum utilization of available resources. Tactical commanders are furnished up-to-date status reports on supply materiel readiness, and unit personnel to assist them in managing their assigned logistical, personnel, and administrative functions. The genesis of CS3 stems back to 1965 and has now reached the stage where fielding is scheduled during 1973.

The Army's approcah to improving command and control capabilities, to include the incorporation of tactical automatic data processing systems, is the IBCS concept. IBCS is the structural framework of personnel, equipment, and doctrine for integrating the functions of combat into a coherent land combat system. The objective is to provide the ground force commander an increased capability for planning, directing and controlling combat operations. TACFIRE, TOS, and CS3 are all a portion of the IBCS concept—a concept through which comanders will be able to gather timely intelligence, and, through rapid communications and control, command his resources to destroy an enemy. IBCS has been and will continue to be, a major effort, not only of the Intelligence and Control Systems Group, but also of the Combat Developments Command.

JAG

Conference at the bench. Military justice is a primary JA function which this Agency addresses. One study, Court Reporting Systems, analyzed the role of the court reporter. The expanded need for these trained individuals has led to consideration of alternate methods of performing court reporting (stenographic, open microphone), and to improvements in the existing equipment for closed microphone. Another Study, Justice in the Modern Army, will make projections of how our current problems will be solved in the future, and how more and better justice can be provided at less cost.

Legal Assistance. The legal service extended to the greatest number of Soldiers is private advice on personal legal problems. The problem is the rendering of this assistance whenever and wherever it is needed. Here, the legal assistance

officer of the 1st CAV is helping a trooper about a problem back home. This Agency has ensured that sufficient JAG officers are placed in divisional TOE to meet the needs of troops and commanders, and is currently studying future needs in the Study, JA Personnel Requirements in Type TOE Units.

Coordination and Advice. As a member of the Commander's special staff, the SJA is called upon to advise and coordinate with many individuals. His staff responsibilities have been clarified recently in the latest edition of FM 101-5, and the relationship between him and his commander is stated in two forthcoming field manuals written by this Agency, FM 27-1, Legal Responsibilities of Command, and FM 27-2, Staff Judge Advocate Responsibilities.

The Modern Army Lawyer. As military level problems become more complicated, the JAG Officer must become more sophisticated in the tools available to him. This Agency will shortly begin a study entitled Automated Legal Research, which explores the possibility of computerized data input and retrieval, both on points of law and on facts surrounding the case—the accused, the witnesses, etc. The general trend towards the use of highly competent operators with the most modern equipment is being followed by this Agency to produce the greatest amount and highest quality of legal services for the dollar.

MAINTENANCE

The USACDC Maintenance Agency, located at Aberdeen Proving Ground, Maryland, and commanded by Colonel Robert W. Samuel, is the largest and one of the most unique field agencies in the USA Combat Developments Command. It is unique because of its wide range of activities and because it has a major mission division located at another major Army installation, Redstone Arsenal, Alabama.

Established as the Ordnance Combat Developments Agency in 1962, when it was concerned primarily with combat developments related to maintenance, supply, and specialized services related to Ordnance Service, the agency mission and size have expanded considerably over the years. On 24 Jun 66, the agency was redesignated the CDC Maintenance Agency, and since that time has been concerned with maintenance support of all types of Army materiel, and encompassing all types of commodities (except medical). Thus, it became the one agency in CDC responsible for day-to-day coordination and liaison on materiel development and related problems with all commodity commands of AMC. Further, the agency found it necessary to coordinate and cooperate, on a routine, day-to-day basis, with practically all the service schools in the Army school system, and is presently a member of several Center Teams.

For years the agency has had a special element responsibile for improving the productivity and quality of agency products thru application of operations research and systems analysis techniques. Thru use of such techniques, the agency was able to increase both the quality of its products thru application of automation to TOE development, creation of computerized force models, and automation of MACRIT data. Automation was also applied to reliability analysis packages.

Another aspect that makes the agency singularly unique is its total CDC responsibility for development of reliability and maintainability characteristics in materiel need documents for virtually all types of commodities. To this responsibility is coupled the mission of validating performance of RAM characteristics through development acceptance testing of Army materiel.

Since its inception in 1962, the Maintenance Agency has developed a multitude of doctrinal publications and TOE structures to provide doctrinal and organizational guidance for the support of almost all types of Army equipment. It has pioneered in development of MACRIT data, has developed or refined MOS related to maintenance and maintenance related services and EOD. It has also played a major role in the CDC FM innovative program by pioneering the use of color-coding as a rapid index to maintenance doctrine within field manuals. Currently, one of its biggest projects is the development of the Field Army portion of the Standard Army Maintenance System. The latter is expected to standardize and simplify maintenance reporting and management of maintenance operations within the Army in the Field.

MEDICAL

The New Combat Zone Hospital. The latest innovations in medical equipment, technology, and organization have been combined in USACDC's design of a new army in the field, Combat Support Hospital (TOE 8-123H), which was field evaluated as a provisional unit in June 1971. The hospital is organized using a modular "building block" concept. It is designed to provide hospital care in support of divisional combat elements. It is highly flexible and can be tailored to provide optimum inpatient medical treatment under a wide range of operational conditions and casualty work-loads. The unique "plug-in" "plug-out" capability of the modular concept provides the medical planner with a flexible response to changing medical support requirements.

The concept of this highly mobile yet comprehensive hospital is being evaluated as a potential replacement for one-half the number of the large, semimobile evacuation hospitals and all the small, surgically oriented mobile Army surgical hospitals. Activation of the first combat support hospital is scheduled for the fourth quarter of Fiscal Year 1972.

The Combat Support Hospital uses the Medical Unit, Self-Contained, Transportable (MUST) shelter system. The MUST system's complete range of environmental control (air conditioning, temperature, humidity, electrical power, and positive pressure) prevents contaminated air and dust from entering the surgical suites, patient treatment areas, and wards. The familiar MUST-equipped surgical hospital which is to be phased out of the troop basis has operated for six years in Vietnam; and the equipment has been proved in practice. The Combat Support Hospital, however, is three times the size of the surgical hospital and, in normal operation, can care for 200 inpatients including 40 intensive care, 80 moderate, and 80 minimal care patients. The hospital is staffed by 162 enlisted men and 68 officers. This is the largest hospital redesigned to date to use the MUST shelter system. The Combat Support Hospital moves its air-conditioned, fluorescent-lighted, turbine-powered wards, operating rooms, X-ray, and laboratory on standard Army vehicles and specially designed dolly sets bringing the finest in modern hospital facilities to the Soldier in the battlefield.

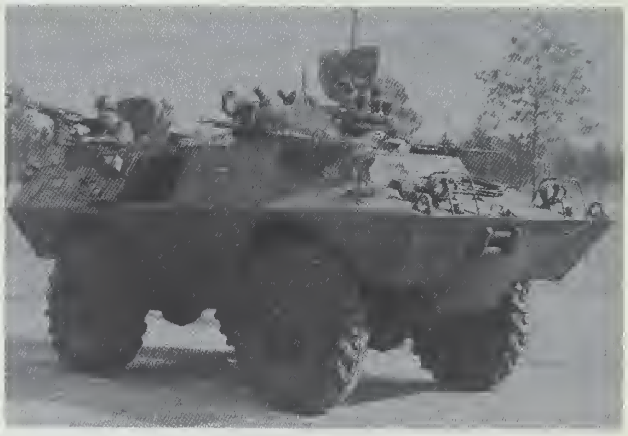
A new FM talks to the combat medic. The Medical Service Agency has recently forwarded for publication an innovative field manual designed specifically for the combat medic. FM 8-22, *The Combat Medic*, is a radical departure from the conventional field manual style. It might be called the paperback technique. This innovative style of field manual writing employs a modern language style, a format similar to newsstand paperbacks, i.e., no table of contents, paragraph numbering, index or references. Field review comments on the initial draft indicated mixed reaction to this style. However, a survey of 131 MOS 91B personnel (those personnel for whom the manual was designed and written) was completed at Ft. Sam Houston. The survey revealed the style and concept to be highly acceptable by those with combat experience. The manual "tells it like it is" by giving the combat medic an insight as to what he can expect in the performance of his mission in a combat environment. It refreshes and maintains the basic factors of his MOS training in a comtemporary manner that is readily understandable.

The Medical Service Agency takes a look at hearing. In early September members of the Agency hosted an Acoustic Protection Conference. Representatives of industry, the military, and the medical field met to discuss the current incidence of acoustic damage to military personnel and to look into what is being done to retard or prevent a rise in hearing losses among our GI's. Discussion included such topics as the medical aspects of acoustic damage, the methods of measuring noise levels and the attenuation characteristics of protective devices, the noise levels of military materiel, and the present state-of-the-art in acoustic protection. Comments delivered from the floor during the meeting by several attendees indicated that this conference was undoubtedly the most profitable of its kind held in several years.

MILITARY POLICE

For the past 10 years, the USACDC Military Police Agency has formulated and documented current doctrine, materiel requirements, and organizations of the Military Police Corps pertaining to the Army in the field. This has been provided by a methodical measured system of time-phased combat support and combat service support studies and actions—to include field experiences and lessons learned for the integration of new or improved military police doctrine, materiel and organization into the Army in the field for the future.

In providing the Army with vision, the Military Police Agency has probed into the future with a fine scale look at the Army's needs today in the development of doctrinal field manuals, tables of organization and equipment and materiel for the Military Police Corps and for the Army as a whole. Areas covered include civil disturbances and disasters; confinement and rehabilitation; criminal investigation; discipline, law and order and crime prevention; physical security; police intelligence; prisoners of war and civilian internees; traffic control as well as rear area protection (RAP) and stability operations, with appropriate integration through modern automatic data processing systems.



A familiar sight for several years in Vietnam, the V-100 vehicle proved its worth in such duties as convoy escort, route reconnassance, anti-ambush patrol, and other combat missions for the military police. Pictured here is the V-150, the big brother to that vehicle, which is presently being tested at the Military Police Agency. This new vehicle was designed after reviewing user comments and suggestions from the field for improving the V-100. In addition to better riding conditions inside, the vehicle has a needed secondary weapons system, rear mounted, capable of 360° fire.

NUCLEAR

Transferred from CONARC to the newly-formed CDC in 1962, the Nuclear Agency has continued to function as the only Army organization completely dedicated to providing operational and technical nuclear expertise to agencies both in and out of the Army. The Nuclear Agency has been considered an elite outfit by people throughout the nuclear community in view of the demonstrated professional and technical qualifications of its officers (all with at least Masters degrees in a scientific discipline and representing seven different branches of service) and enlisted and civilian personnel.

Since its incorporation into CDC, the Nuclear Agency has prepared the requirements package for 17 nuclear warhead sections for Army systems ranging from those used in atomic demolition munitions to those proposed for the SAFEGUARD and the Site Defense of MINUTEMAN programs. These tasks necessitated continuous interaction with AEC laboratories, AMC, and the Department of the Army Staff.

The Nuclear Agency, relying on the talents of a small core of enlisted scientific and engineering personnel, has developed some 28 sophisticated computer programs for evaluating the effectiveness of both nuclear and non-nuclear munitions against a variety of potential targets. These programs are the basis for preparing the Joint Army-Marine Corps field manuals on nuclear weapons employment used by US and NATO forces. Significant Nuclear Agency studies which compared the effectiveness of conventional and nuclear munitions, and which developed methodology for employing multiple weapons against single targets also relied on these in-house developed models.

The concept of materiel survivability in a nuclear environment being balanced to man's effectiveness in that environment originated at the Nuclear Agency ten years ago, and this philosophy and methodology have since evolved to their currently accepted status, including adoption by both Quadripartite and NATO nations. Of a variety of nuclear effects studies and analyses performed over the years in all effects areas from blast to nuclear radiation, standouts include two iterations of determining criteria for personnel casualties and safety. In addition, the Nuclear Agency has acted as OCRD agent in preparing 10 annual editions of the Army's official statement of requirements for additional nuclear weapons effects information, a document which guides and justifies funding for most Army efforts in this area.

PALS GP

The US Army Combat Developments Command Personnel and Logistics Systems Group (formerly Combat Service Support Group) cut its teeth on Combat Service to the Army (COSTAR II) study which developed the Field Army Support Command (FASCOM).

The Administrative Support, Theater Army (TASTA-70) study was the first major effort on reorganizing and restructuring the Communications Zone (COMMZ) which occurred since WW II. It is the DA approved doctrine of the Army in the Field today.

Army-75, Combined Arms and Support (CAAS) -75, a tremendous effort, has been the basis for many of our on-going study efforts. In addition, PALSG developed Airmobile Support Concepts resulting from the Howze Board and contributed a major study on air lines of communication—LOG-ALOC II.

Paralleling the foregoing developmental studies was the program known initially as CCIS-70, now called CS^3, the automated management system for the entire Combat Service Support System for the Army in the Field.

Not withstanding, the Group's bread and butter product is Organization and Literature. Since the activation of PALSG in 1962, 130 Field Manuals, 24 Training Texts, 543 TOE's, 17 MTEL's and 80 MACRIT's have been completed. The last area of accomplishment comes in the Materiel area where numerous QMDO's, QMR's SDR's and Materiel Need Documents were developed.

SPECIAL OPERATIONS

The Special Operations Agency located at Ft. Bragg, N.C., has reorganized three times since its beginning in July 1962. Originally called the Special Warfare Agency, it combined with the Civil Affairs Agency in 1968 and was redesignated the Institute of Strategic and Stability Operations. Finally, in conjuction with the overall reorganization of CDC in 1971, the Institute was redesignated the Special Operations Agency. Its current mission is to develop doctrine, organization and materiel needs for stability operations and for unconventional warfare, civil affairs and psychological operations across the full spectrum of combat.

To accomplish its mission, approximately 70 highly dedicated officers, enlisted men, and civilians have worked closely with both active and reserve forces to insure that doctrine, organizations, and materiel improvements met the needs of troop units in the field. The many proponent field manuals, tables of organization, and equip-

A significant materiel project of SOA is to improve the High Altitude Low Opening (HALO) parachute system. Canopies being evaluated by SOA and Special Forces personnel include the Paracommander and the MC1–1.

ment items were continually updated, revised, and evaluated.

Several significant studies have also been completed over the years. The most recent and better known are the Mix of Civil Affairs Active and Reserve (CAMIX) and Captured/Detained US Militady Personnel (USPOW). The CAMIX study established criteria for determining the best mix of civil affairs active and reserve units in the force structure. The study results will be used primarily for reference in developing future civil affairs requirements. The USPOW study, completed in March of this year, developed new and revised old US Army doctrine for captured US military personnel. It analyzed key Communist POW management principles and applicable national policy in light of their impact upon Army doctrine in the pre-internment, internment, and post internment phases. This study will have a significant impact upon doctrine and future training policies.

The Agency is currently working on two more major studies, Civil-Military Operations (CIMO) and Army Advisory Assistance in Stability Operations (ADVASO). When completed, these two studies will have a major impact on US Army doctrine for advisors engaged in stability operations and staff officers assigned responsibility for civil affairs and psychological operations.

SSI

Since its inception, the Institute has produced over 48 major study efforts dealing with the short, mid, and long range time period. Institute studies have encompassed the world in scope or have limited their study to specific regions. Studies have dealt with both nuclear and conventional warfare. Broad requirements for armed forces have been stated in some studies while others have required detailing of specific aspects of military force application. More recently, the Institute has concentrated its efforts toward studies of broad strategy views under sponsorship to DA, ODCSOPS.

To do so, the Institute uses a multidisciplinary study team approach in which a broad range of experience and academic backgrounds are provided by the senior officers and professional civilian analysts who staff the Institute. In turn these capabilities are pulled together to fit the particular needs of a specific study under a flexible task organization of 12 officers and 19 civilians. MG F. M. Davis is the Commanding General and COL J. P. M. Hughes serves as Deputy Commander.

Throughout its existence the Institute has sought to consider political, economic, sociological, psychological, and scientific and technological factors as well as military factors on development of studies to assist the US Army in achieving US national objectives during peace and war.

SUPPLY

The USACDC Supply Agency is charged with the design responsibility for the supply and field services system for the Army in the field, and since the inception of the US Army Combat Developments Command in July 1962, has performed a leading role in the design, and subsequent formulation, and documentation of the systems.

The Supply Agency's first major contribution consisted of developing the COSTAR doctrine for functionalized supply support in the Army in the field together with supporting FMs and TOEs. Attention was then directed to The Administrative Support, Theater Army (TASTA-70) studies in which the Supply Agency extended functionalized and integrated supply support to encompass the COMMZ. TASTA-70 is now reflected in current DA approved FMs and TOEs.

Supply-75, the Agency's latest study of the overall supply and service system for the Army in the field, has been approved for use within USACDC as guidance for the 1970-1975 time frame.

Presently the Agency is actively involved in the development of the Standard Army Intermediate Level Supply Subsystem (SAILS) and the standard Army Ammunition System (SAAS). These systems are designed to standardize and achieve centralized management for selected class of supply (Class II, IV, VII, XI, and V).

SAG

The motto of the USA Combat Developments Command is "Vision to Victory." To help the Commanding General achieve 20-20 vision by giving him his own capability for scientific analysis, the Systems Analysis Group was established on 1 August 1967, and given the mission "To provide operations research, systems analysis, and related scientific support to USACDC." Under the leadership of our Commanding Officers, Colonels Charles W. Calvert, Charles B. Hazeltine and Herbert J. Childress, Jr. and the technical direction of Dr. Marion R. Bryson, the Group has moved from a small element almost unknown within USACDC to a significant factor in the ability of the Command to perform its mission. The growth has been marked by a consolidation of the Command's operation research system analysis assets within Systems Analysis Group.

SA Group is supporting the command in many major efforts including the Advanced Attack Helicopter, MBT and CONAF. The Group looks forward to assisting the Command in solving the pressing problems of the future.

TRANSPORTATION

One of the most important projects in which the US Army Combat Developments Command Transportation Agency was involved during the period 1962 to present was the Army Logistic Support Concepts—Air Lines of Communication (Revision) (LOG-ALOC II) study. This effort was directed by the Chief of Staff of the Army to determine the feasibility of using C-5A aircraft for support of Army units as far down as battalion level under various scenario situations. This study, approved by the Department of the Army, consisted of over 4,000 pages of data and required 33+ man-years to complete. The produced report has provided valuable data throughout the military service and has been used by DA in follow-on actions concerning the impact of the C-5A aircraft.

The LOG-ALOC approach to computing supply requirements based on consuming items in a unit rather than pounds per man per day was accepted by DA. This approach has led to subsequent refinements in computing supply requirements which are now used when preparing ongoing studies.

ARMOR

M551 Sheridan, firing the Shillelagh missile.

The past decade has been an era of progress for the CDC Armor Agency. Located at Ft. Knox, Ky., the Armor Agency has been involved in many projects affecting the strength of our modern Army.

The Armor Agency has been concerned with the future of the Army's armored fleet. Studies in this area have included the M60A1E2 Study, which was responsible for improving the Army's M60 Main Battle Tank. The MBT-70 Study examined a new tank that would be effective in mid and high intensity conflicts. This study evolved into the XM803 program. Even though this program was halted by the U.S. Congress, many valuable additions to the future tank programs were made. The Laser Range Finder is just one of those many additions. The Armor Agency is now involved in the Main Battle Tank Task Force, which is assigned the mission of putting together an over-all Army tank program which integrates the current inventory of tanks in the Army, their product improvement, and investigates the requirement for a new Main Battle Tank. This study will be completed in early August.

Over the past decade the Agency has revised Armor Field Manuals and conducted TOE reviews. They have also examined the reconnaissance role of Armor through the M551 program and the Armored Reconnaissance Scout Vehicle program.

The role of the helicopter in the anti-tank role has also been an active program.

The Armor Agency will continue to search for ways to improve the firepower and mobility of our Armored forces.

AIR DEFENSE

High intensity efforts characterized the past decade of progress in the CDC Air Defense Agency at Ft. Bliss, Tex. The Air Defense Agency has been accorded priorities encompassing an entire program through the 1985 timeframe.

In the SAM-D (Surface-to-air Missile Development) area, a system to replace the NIKE HERCULES and HAWK systems, ADA continued efforts to establish a Materiel Need document for SAM-D while preparing and publishing a communication requirement to provide detailed guidance not included in the QMR for SAM-D. The Agency also conducted field surveys of Chaparral/Vulcan battalions in CONUS and Europe. These surveys highlighted areas which require Center Team action.

Air Defense Agency has also conducted extended field tests of the Redeye missile system.

The Vulcan

PASA

For the past year a team of military and civilian analysts at PASA have been studying and writing about today's young people to learn more about some of the problems that will face them and the Army during the 1970's. This effort took form under the title "Personnel Offensive (Phase I)."

It contains what may be considered as guidelines for the Army of tomorrow in addressing problems of youth. The study contains more than 178 "alternative approaches" to problems relating to personnel—innovative proposals which we believe will help make the Army a more satisfying life style for men in uniform and result in a more professional Army for this time frame.

These approaches have been designed to improve the capabilities of the Army to accomplish its overall mission while recognizing the changing attitudes of the new generation of men which will fill its ranks.

Together they underscore the Army's increasing willingness to consider constructive changes in tradition and practice coupled with a concerted effort and desire at the highest levels to make the Army a truly professional force.

Underlying the entire study is the consideration that the youth of the 70's is looking for a sense of accomplishment and meaning beyond the need for security and comfort. He will be highly motivated to succeed and, contrary to some popular opinion, he will generally possess the same values as his parents. Today's youth is highly educated, extremely sophisticated and far more concerned with the rights and needs of individuals than with institutional requirements. These and other characteristics have gained increased visibility in the past few years, and while it isn't necessarily true that 40 million youngsters can't be wrong, it is an absolute certainty that they cannot be ignored.

Like the civilian community, the Army can neither avoid nor ignore the challenges of youth. In short, PASA's assessment found that the transition to the modern volunteer concept will be difficult. This difficulty will, in part, result from constraints, dictated by institutional necessity, and outdated philosophies and practices.

The study was presented and accepted at a decision briefing to the DCSPER, General Kerwin on 13 January for staffing to the Chief of Staff.

One of the primary purposes of this study was to achieve a closer correlation between Army personnel policies and personnel doctrine for the Army in the field. This purpose was accomplished by close cooperation and coordination between PASA project personnel conducting this study, and the Army staff. Consequently, many of the approaches identified in the study by CDC have already been adopted as Army policy. This is demonstrated by the fact that the HQ DA proponent agency, DCSPER, found that 117 of the approaches are already in use or being considered by DA.

A second phase of the study was found to be desirable by the DCSPER and Phase II was confirmed by CofS in a January 1972 letter to CG, CDC.

The letter stated that several of the ideas contained in Phase I: "Are the most innovative and forward-looking personnel policies developed during the past year. Also, that a second phase *would* be desirable to develop some of the ideas further and to continue the dialogue between CDC people and the Army staff." Accordingly, a draft tasking directive has been initiated and is being staffed at HQ DA.

The need for Phase II results from the fact that compared to other more gradual changes in personnel policy since World War II, the decision to operate the military personnel system in a draft-free environment presents a major challenge to maintenance of appropriately-high personnel standards. The quality of the Ameriacn Soldier in the 70's has been considered an important factor in decisions in such areas as pay and financial incentives, qualitative and quantitative control of personnel management, and human relations (race, drugs, and discipline).

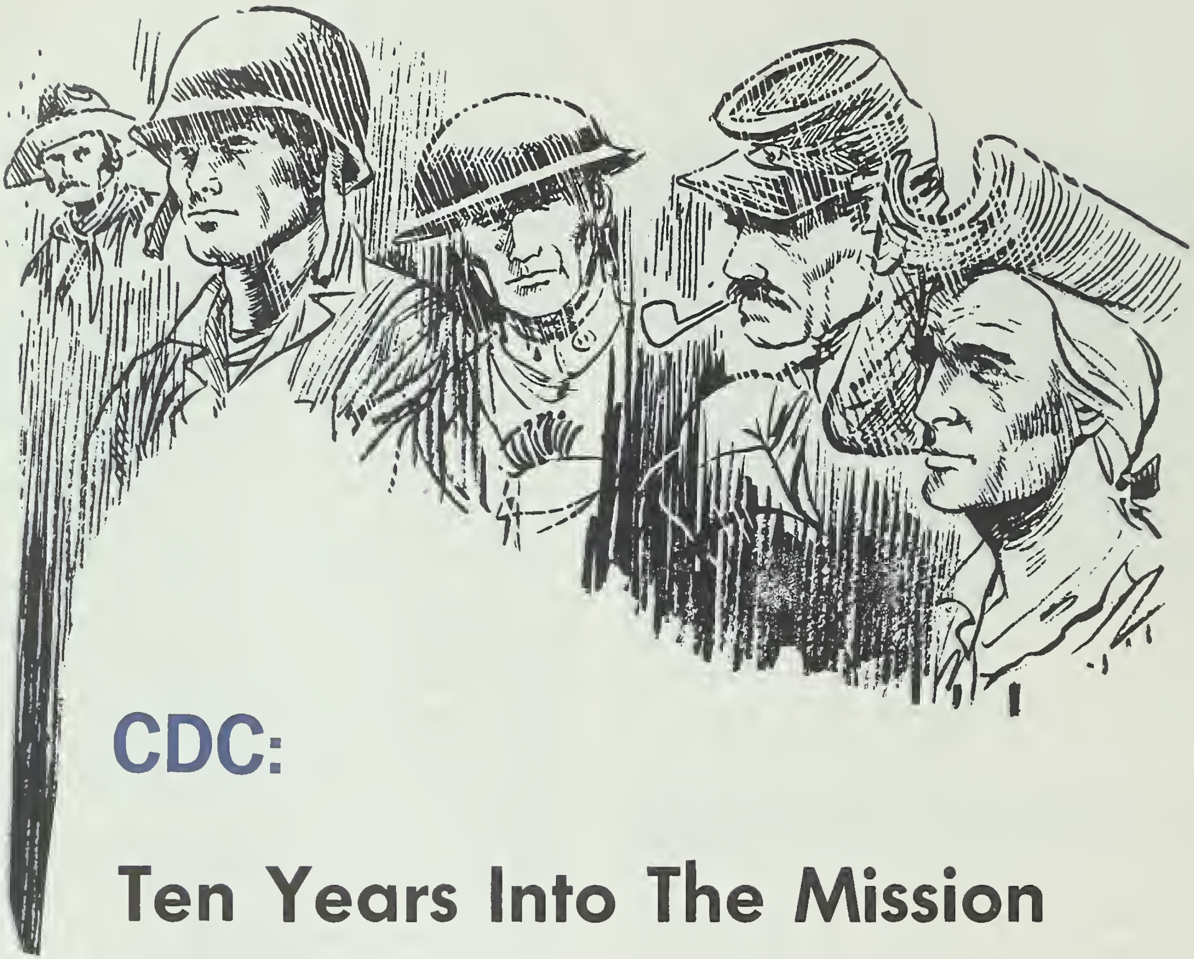
The American Soldier in 1970's Study—Phase II is now required to develop a common set of qualitative profiles and projections of these profiles into the future. These profiles are needed to improve personnel planning and personnel studies through standardization of the measurement and projection of qualitative information about the American Soldier in the 70's.

The study analysis will use these two profiles that have been developed as a base for examining the environment of the Army of the 70's to pin-point those problems that may be encountered in trying to match our manpower resources with the requirements of the Army in the current and the future time frame of FY 1974-1976. This will require a clear look at current personnel polices and procedures.

The projected Soldiers' profile will give us a picture of what the Army wants, needs, and can reasonably expect to attain.

The study will develop recommendations for alternative concepts or approaches in personnel policies, procedures or practices that will satisfy the identified problems as well as reinforce those positive aspects now in being.

What do we hope to accomplish in the American Soldier of the 70's effort? Certainly we must demonstrate maximum concern for the individual and his problems. We necessarily will be concerned with his personal development, his motivation, his abilities, his job satisfaction and his overall welfare. We must assure that human factor considerations are applied to all personnel policy developments.



CDC:

Ten Years Into The Mission

by BILL HERMAN

What's ten little years to an Army that's 197 years old—a year older than our country? No big thing maybe. But being a year older than your country is no easy trick for an Army to pull off. There had to be *some* kind of planning—or at least a *vision* of victory, or there would not have *been* a country.

Those were rugged first years between Lexington Green in 1775 and 1783 when the new Congress ordered the new Army almost totally disbanded. To suggest even a figurative comparison with CDC's first ten years would be too brazen, but as we look back on the years since CDC's birthday in '62, we recall many strident voices also calling for the dismemberment of today's Army. So, from this background, this is how CDC views its first ten-year part of the Army's first 197 years.

What kind of an Army did CDC find when it activated in '62? Well, for one thing, an Army trying to *find itself*. And, in some cases literally, because the Reorganization of 1962 had some surgical aspects; when the operation was over, eight traditional Branch chiefs and their Command activities were missing, such as Ordnance, Quartermaster, Signal, Transportation, Finance and Chemical. Also missing was a clear picture of the Army's combat developments. There were many people working on it, but CDC was created to answer the question: "Who and where are they?"

And by '62 the question was getting urgent because *everyone*, it seemed, had his own developments program which he played close to his belt—until he was ready to pop the wraps off his "product." This was met by wails of (1) joy, or (2) anguish—from people who were also working on one or didn't want one in the first place. The story was told at that time of the company commander being called to his supply room to view "something" laid out on the floor. "What the Hell is it?" he asked. "Don't know sir," said the Supply Sergeant, "but it says here we're getting *seven more*—and a half-ton of spare parts for it."

This was proliferation's finest hour: an unidentified product, from an unknown developer delivered to an uninterested user.

Whatever else was wrong about Army combat developments, it was also a "stable for hobby-horses"—the favorite projects of a fanatic few. CDC "pioneers" tell of one such hobby-horse item sponsored by a well-known Army figure not generally associated with whims and flights of fancy. The "fancy-thing" he proposed was not only weird, but defied identification as to which technical service should have proponency; he not only crossed out of reality (sometimes forgivable in this trade), he crossed all *service* lines. The result was that his brain-child bounced from branch to branch throughout the entire developments community, propelled by its only strong feature—its refusal to die (or even get *lost* very long). Eventually, the sponsor retired and after a few more trips through the circuit, so did his "project."

Actually it was the existence of "that new outfit at Ft. Belvoir" that killed this hobby-horse and many others like it. A Colonel in CDC's early days had a large sign framed on his wall reading, "The Ideal combat developer is one who knows when to bury a dead horse."

While many fought it, others in CDC's early years merely smiled when the command was referred to as "The Army's Cynics and Critics." This generally came from industry people who found their airy proposals being met with a hard scrutiny and a blunt question: "What'll it really *do* for the Soldier on the battlefield?" They were running into people at CDC who had three wars behind them and said things like "This looks like a fresh coat of paint on a gadget that didn't work in World War II *either*."

While CDC was a new command, many people in it were not new to combat developments. Many, in fact, had developed considerable heartburn and scar-tissue while soul-searching and sponsoring in R&D. Thus, when you put them all together, some in industry called CDC the Army's "smallest and nastiest command."

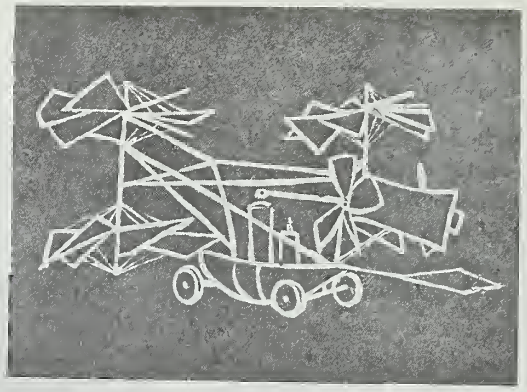
But that was the materiel and hardware systems picture, and it's still the same: what will the item (or system) do to increase the combat effectiveness of the Soldier and his support? While CDC's role was to assure the orderly development of materiel resources, most of its effort went to the most important resource in the combat effectiveness picture—people. These are the organizations who would be "married" to the systems, with doctrine (or tactics) performing the ceremony. And, by no mere coincidence, CDC embarked on its doctrinal mission in 1962 almost simultaneously with the formation of the Howze Board. This group took a hard, calculated look at the Army's tactical mobility and opted for the helicopter and airmobile units as an interim answer to our battlefield needs.

And the whole generic field of "airmobility" remains a principal effort in CDC today. In the early Sixties CDC wrote the plan of test and the battery of 25 tests that allowed its "Clipboard Corps" to collect the evaluation data for the 11th Air Assault Division, later First Cav (Airmobile). This evaluation has never stopped, it might be said. The almost daily performance of the First Cav and other "airmobilized" units in Vietnam were scrutinized by CDC through the Lessons Learned program and the debriefing of returning leaders of all ranks. These data are now "banked" in the programs looking into the airmobile division effectiveness in other world environments.

This puts CDC deeply into another generalized activity called "force design" and with no small impact on the Army's future size and effectiveness.

The Vietnam and airmobile experience is "cranked into" the TRI-CAP, or Triple Capability, division tests at Ft. Hood and elsewhere. This airmobile Infantry, attack helicopter and tank force (actually the First Cav Division, TRI-CAP) is looking into several force alternatives including the Air Cavalry Combat Brigade, while also performing for MASSTER, Mobile

"Airmobility remains a principal effort of CDC today."

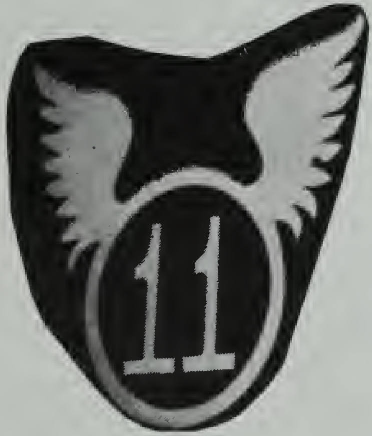


Army Selected Sensor Systems Test, Evaluation and Review. CDC's interest here is to assure that the Army's best combat "mixes" also have the benefits of our best present and future technology in finding the enemy and getting him under fire at the longest ranges and shortest time.

In CDC's "Marryin' Sam" role of marrying up people-and-things, other types of divisions in the Army get their share of attention. Many combat developers in CDC today are aware of the route the division has traveled. Or should we say "road?"—because before ROAD AND ROADAC there was the Pentomic Division, also Pentana, INFANA and MOMAR.

Now CDC is deeply engaged in CONFAD—Conceptual Design of a Family of Army Divisions—and CONAF—Conceptual Design of the Army in The Field. Both these programs can be called "force-mix analyses" with CONAF providing five different force alternatives for the Army in Europe in the 70s. These force mixes do not aim at an idealized Army but a *realized* Army—one in which combat effectiveness is not just potential, but actual. And to do this CDC must focus ten years of developments activity to provide these divisions with the people and the means to accomplish the combat mission at acceptable costs. Thus CDC's computers chatter over some 3,000 programs that seem to affect every item and moment of the Soldier's life.

While almost all seem to fall under "increasing the Soldier's mobility," CDC is concerned with more than his ability to see-move-shoot and communicate. Just as vital is how he is fed, led, tested and rested; how the details of his life are administered. This requires a well-designed, integrated logistics system to CDC; one that's responsive to our new mobility.



A MILESTONE SYMBOL OF ARMY MOBILITY. This is the insignia of the 11th Air Assault Division (TEST) activated at Ft Benning in 1963 to run through a battery of 25 tests for CDC's operations analysts and data-collectors. Evaluation of tests showed such promise that the division was redesignated the First Cavalry Division (Airmobile) and ordered to Vietnam in September 1965. Lt General Harry W.O. Kinnard who commanded both the 11th and the First Cav in Vietnam, became the first of three former Cav commanders to also command CDC.

All this must be programmed concurrently, almost simultaneously, while providing the guidance for systems like an effective attack helicopter and utility transporter, a high-performance tank and a sure tank-killer, jam-proof and Soldier-proof communications and small arms. In short, all the way down the spectrum-of-needs to helping the Army in its Civil Affairs and domestic emergencies roles.

As the Army's requirements-stating organization, CDC looks at the Army through bi-focals; it sees the Army as an entirely total Land Combat System—and it sees the individual Soldier who fights or supports. This requires a unique personality and background—and a unique outlook. In a recent conversation a friendly but frustrated industry respresentative who had his latest proposal shot down said, "What you CDC guys are always asking for is something light, cheap, and *edible.*"

The CDC man was not needling the industry man by being hard to please; he was merely doing his duty as expected of all CDC—to know the world environment so well, and the potential of our technology and our enemies, that we can state *what* we need and *when* it should be delivered. In short, a professional optimist who knows the real world.

Is that an idealized organization? Not really. In the vernacular, we've come a long way, baby since a famous four star Army leader said "I visualize CDC as a building full of Colonels with nothing on their desks but their feet." It didn't work out quite that way because the desks arrived at CDC already cluttered with hundreds of existing developments programs in various stages of life and half-life ("used and abused"). This and the Vietnam war thrust CDC into the very real world during its early days, but it also managed to keep a few weather-eyes peeled on the future. This, coupled with some modernized managerial techniques, helped CDC pick up and maintain the developments momentum required to keep the Army in step with the present and a step ahead of the future.

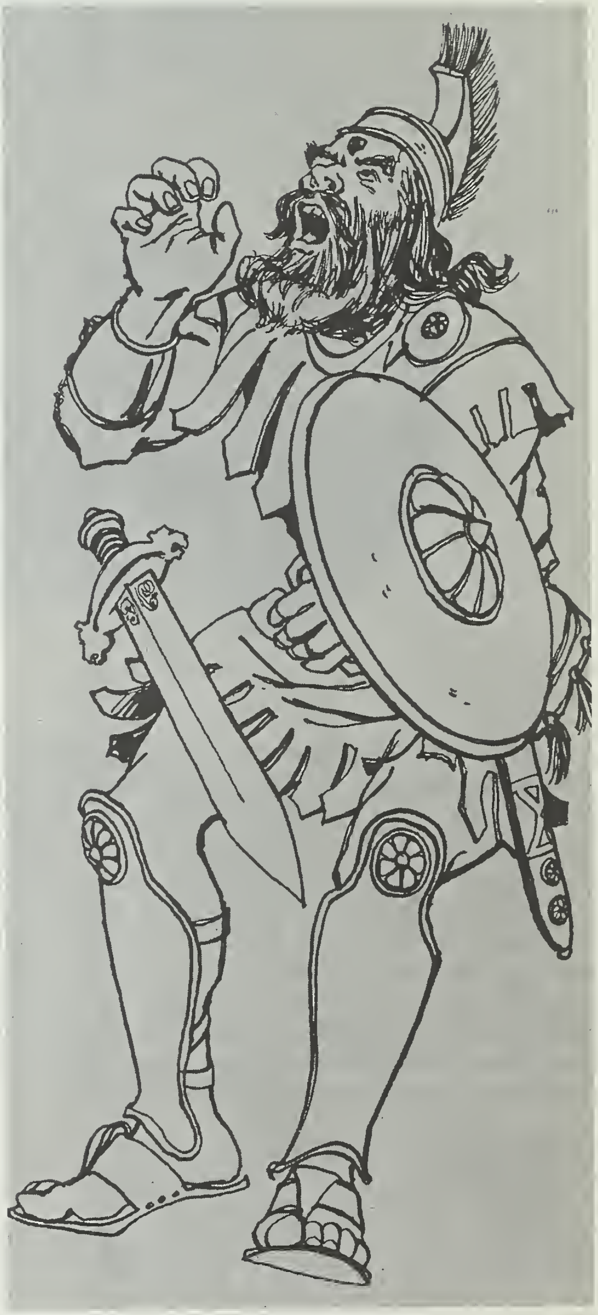
That's not a simple mission for a command—to live and work in two dimensions, the future and the present. But it can be done.

CDC's been doing it for ten years now.

Ancient Heritage of Combat Developments

Though the science of combat developments is a recent phenomenon, its principles are rooted in antiquity. Ways and means for improving armies have absorbed the minds of military commanders since the earliest man. One of the world's first "combat developers," Philip II (382-336 B.C.), King of Macedon, was also one of its greatest. Philip was responsible for the first scientifically conceived army to appear on the continent of Europe. He placed the Greek phalanx on a new tactical footing by eliminating its weaknesses, while at the same time building upon and exploiting its strong points. Though Philip retained and strengthened the traditional depth of the phalanx, he discarded its equally traditional but unwieldy length, in recognition of the many vulnerabilities of a long and wavering line.

In equipment, Philip armed all or nearly all of the footsoldiers with the *sarissa,* a pike which was about twice as long and much more effective than the prevailing heavy infantry spear. He further developed the missile throwing catapults of the ancient world into the first true artillery arm, an accomplishment proving tactical creativity of the first order. Finally, Philip devised a new and radically different method of employing his cavalry, by hinging his heavy and light horse as highly mobile wings on the phalanx's right and left flanks, respectively. This gave him an attacking force possessing both power and speed. So formidable was the instrument of war which Philip bequeathed to his son, Alexander the Great (356-323 B.C.), that more than a few military critics have questioned whether the latter could have been defeated by any of the earlier armies of the gunpowder age. Without the combat developed army he inherited from his father, Alexander would have accomplished nothing; with it he was able to conquer Asia as far east as India.



Long enough to cover the subject, but . . .

Short enough to be interesting

for details turn the page

Writing Is A Skill: Rewriting Is An Art

WRITE ON RIGHT

". . . loosen up on the formalized definitions."
". . . knock off the stiff methodology approach . . ."
". . . we ain't staff types . . ."
". . . try and *talk* about the subject, not *teach* it . . ."
". . . Not suitable in its present form . . ."

These comments from magazine editors are typical of those we receive all too frequently about CDC manuscripts. Unfortunately, much time and effort goes to waste when we can't use your article in the *Arrowhead,* or we "can't sell" it to other magazines. In most cases the idea is good, but it's just not put together so it will appeal to the readers, or the idea has already been used by somebody else. Yet the editors are begging for articles. To help us, I asked our specialist, Bill (Reinhold) Herman to come up with hints on how to write something that will sell. I think he did a fine job and we are running it here. Incidentally, *Arrowhead* welcomes articles from our many readers outside CDC, too. It doesn't have to be about an on-going study or project. If you have an idea on something in the combat developments field which you think will be useful to the Army, write it up and send it in. But, as Bill says, it would be helpful to drop us a line, or call us to discuss your idea before starting to write.

Editors get bags of mail.

But editors don't *read* bags of mail.

How come?

Because some article manuscripts they take out of the mail bags seem to shriek, "Don't bother!" Even though the titles may indicate a provocative subject area or style, many editors will "Deep Thirteen" (reject) them at once because of manuscript *form*. Not only are they difficult to read, but blurred, single-spaced, marginless "walls of type," tell the editor he's dealing with "unprofessionals." Many editors also have "prereaders"—people who see the manuscripts first so they can keep bad ones away from the Beast-Editors whose universal trait seems to be a hair-trigger temper.

Granted, you're not in CDC to become a professional writer, but we'd like to help you produce article manuscripts that will not only get by the pre-reader but also make the editor calm down and read it-and *print* it . . .

Our job in the CDC Information Office is to "market" your writing; we're your "literary agent," you might say. However, getting things printed—from a club bulletin to Life magazine —is competitive. (Competitive? Hah! It's a "gentlemen's jungle.") Our task is to go into this jungle with the most marketable product we can get. So while your manuscript is around this office waiting for one of us to rewrite parts of it, or have it all re-typed or to get challenges from our staff reviewers justified, an editor is accepting the same kind of article *from somebody else.*

So here are some general notes on the form, technique and "tactics" of writing for publication.

Most editors prefer an article to start about halfway down the first page.

All manuscripts should be double-spaced within about one-inch margins, with new paragraphs introducing new thoughts or facts. Use paragraphing, when needed, to break up "walls of black type." (see sample on page 31)

And don't be afraid of a one-sentence paragraph. It's used to add emphasis—and style; like varied punctuation. (See Sample)

If you plan to "slant" your article toward a certain trade or technical media, it's best to study as many back-issues as you can to determine (1) If they appear interested in your type of knowledge or viewpoint, and, (2) If they have, perhaps, just recently *printed* an article on that subject.

And selecting a media only because they "pay well" means, (1) the editor demands professional standards, and, (2) there's fierce competition from professionals.

And please don't ask us to "shotgun" your manuscript to several editors at one time (because we don't do it). This is a traditionally unpardonable crime in editor's books; it's matched in criminality only by sending them articles not in the field of interest (or mission) of their publication. You (we) send the manuscript out to one editor at a time; he either buys it or we take the whipping on the rejection and send it out again—IF another magazine has the same apparent format and requirements. After a few trips to other editors, the manuscript may be a little battered and, perhaps, could use a re-appraisal and a stiff re-write—or a "permanent rejection" and a fresh start on a new approach. (If you're really eager to write, you'd be working on another article anyway)

A word here on writing for pay on duty hours—a no-no. Many magazines do not pay authors *because* they express views and techniques pertaining to a specific trade or branch and such articles generally written on duty. Other magazines pay quite well from a flat $25 to $100 or $25 per page (of 600 words or so per *printed* page, like *Ordnance* magazine). Some pay by the word from 1½ cents in *The Review* (Defense Supply Assn) to a maximum of 10¢ per word for *Armed Forces Journal* and *Army.*

The point to ponder is that if you sell an article that was written as an "office assignment," you'd best make plans to send the check to Army Emergency Relief or Distaff Hall and keep the glory.

Writing-for-pay really means *rewriting* for pay—knocking out every single word that doesn't advance the story or idea. Before an editor will give you some of his valuable space, he needs to be assured that the article is "all meat"—not fatty tissue or gristle-words that make the reader re-chew. Tip: rewrite as though *you* were paying for the article—by-the-word.

A final word about pay. Many magazines pay with a subscription or enter your manuscript in their annual writer's contests. Some only give you a certificate. The point is, some journals that do not pay have a higher literary standard than some which do pay. Your pay is your reputation among your peers and colleagues.

So when you start toying with an article idea, also think *Arrowhead;* it's read by many people in organizations outside CDC.

In lieu of making your own "media analysis," send a raw abstract of your proposed article to the CDC Info Office, or call and tell us a little about it. We try to keep up-to-date on what many editors are printing and looking for. We might even call them for you, in the role of your "literary agents" and discuss it with them. The best we could hope for would be to get their interest in seeing your piece; we might even have a real windfall and get their specifications as to length, scope and point of view. Then we're in business.

Here's some more about "slanting" an article. Show some respect for your *reader* who may barely be aware of CDC, much less operations research techniques. Think of your readers as a mixed bag of ages, talents, backgrounds and *degrees of disinterest*. This goes for the *Arrowhead* too. Writing over their heads won't help their disinterest. Don't address yourself to another CDC expert in your field; we're trying to attract *new* readers—and retain our old ones. And the editor is the *reader's* representative.

Also watch your language! Every trade has its own vernacular (your readers included), but don't use rampant acronyms and phrases just to show what tricky job you have—this is called "trade snobbery" and editors just *stop reading* when it gets too thick. Let's leave it this way: a reader may wish to be *informed* about your job—not *trained* for it.

What happens when your article manuscript gets to the Info Office? We log it in and send you an acknowledgment. At the same time we ship it over to the Staff element in the headquarters that has the strongest interest in the subject area for their review, NOT editing (easier said than done; we sometimes have a terrible time protecting your manuscript from the "compulsive editor syndrome"). Sometimes we start your article right out on a Pentagon clearance via the Army Chief of Information (OCINFO), if there's a good chance an editor will snap it up. Just as often we "bootleg" a copy of your manuscript to an editor or we "tease" by 'phone. But again, one editor at a time. Now see why we want *six copies* of your manuscript?

Sometimes the manuscripts are too unprofessional to go out (because CDC's journalistic reputation also goes out with it), so we send it back to the writer. This hurts as much as relaying an editor's rejection because we, too, are writers and know it's a lonesome, interesting-but-tedious task.

At other times we deliberately hold a manuscript off the market because the most-appropriate magazine for it is already holding several CDC articles and/or has been very cooperative and we don't wish to impose too much on the editor. But those are our problems of marketing; your task is to submit to us concise, tightly-written and professional-looking manuscripts.

In short, good writing begets a good market.
So write-on!

SAMPLE

Name-Rank
CDC Address

About________words

(Editor will request
biographic data later)

(A double-spaced page of about 25
lines is about 250 words)

Title of Article Goes About Here

- by -

Your Name Here (rank if you wish)

All manuscripts must be double-spaced with about one-inch side margins, with new paragraphs for new thoughts or facts. Paragraphing also helps the appearance of the manuscript and breaks up heavy walls-of-type.

What do editors look for?

Tight-writing, first. Does the writer get to the point, support his point with good, hard-charging simple words? Does it appear to have been cut and distilled to its minimum size and still have a clear message?

What turns editors off?

Just the opposite. Rambling, lethargic sentences full of over-worked militarese or over-anxious acronyms. Editors who pay by-the-word call this "writing on the cash register"---but not on theirs. They'll also tell you "anybody can write a long article." It takes a real effort to "write short" without loss of meaning.

So what's the secret?

No secret at all. The word is "rewrite"---viciously eliminate all words and phrases that do not move the article forward. You may have fallen in love with some of your phrases but if they don't contribute to your point, they only slow up, then stop the reader and kill your whole effort. The rule is simple:

Avoid low-yield language.

(Last name and page number goes on upper left of following pages; key-word or phrase of title goes in upper left).

The Point of the Arrow

June Questions

1. Research in the technology of cryogenics or the physics of extreme cold has uncovered which of the following? (Select 2)

a. In extereme cold poor conductors become good conductors and good conductors become super conductors.

b. In extreme cold metals become brittle and liable to crack or shatter.

c. In extreme cold hydrocarbon fuels burn more efficiently.

d. In extreme cold all solid materials become insulators or very poor conductors.

2. The ZSU–23–4 and the ZSU–57–2 provide high mobile tactical air defense systems. The effective range of the twin 57 is ________ meters.

3. The effective range of the quad 23 in the radar mode is _____ meters and _____ meters in the optical mode.

4. The Hot Cycle, Reaction Drive Concept in helicopters:

a. Envisions diverting engine exhaust gases to drive the helicopter rotor system.

b. Has the advantage of simplicity which results in the elimination of many heavy and complex dynamic components required by other types of propulsion systems.

c. Was successfully tested in the XV–9A.

d. All of the above.

5. The reverse osmosis process is a new technological process:

a. That will furnish one process that can be applied to all water sources to produce potable water including removal of CBR contaminants.

b. That is similar to electrodialysis in that it uses an organic membrane to remove salts from water using hydraulic pressure.

c. That represents a reduction in the different kinds of skills required for operation and different types of equipment that would have to be used by the Field Army to produce drinking water.

d. All of the above.

May Answers

1. The advanced technology helicopter engine, for use in the Utility Tactical Transport Aircraft System (UTTAS), is possible because of?

[✓ a.] Incorporation of large engine, high temperature turbine design principle into a small compact engine.

b. New engine design principles that eliminate the need for high temperatures in the turbine combustion chamber.

c. Advanced engine gear box designs that convert all engine shaft horse power to usable rotor horse power.

d. Rerouting of exhaust gases back into a secondary combustion chamber for additional power and fuel endurance.

2. Acquisition range of an infra-red passive homing missile is most seriously degraded by which of the following?

a. Low ambient air temperature

b. Target speed

[✓ c.] Water vapor content of the air

d. Absence of visible light

3. What problem poses the greatest difficulty to use of infra-red passive homing systems against surface targets such as tanks?

a. Exhaust fumes from diesel engines mask the target.

b. Dense air at low altitudes prevents missile control.

[✓ c.] The missile is unable to distinguish target emissions from background emissions.

d. The position of the warhead in the missile precludes optimization for armor penetration.

4. An electro optical detector named TISEO (Target Identification System Electro Optical) has an automatic track capability that functions on the principle of:

a. Heat given off by target

[✓ b.] Target contrast

c. Target movement

d. Radio frequency energy of target

5. A xenon searchlight obtains its high intensity light source from:

a. A carbon arc ignition using irradiated pure carbon

[✓ b.] An inert gas filament

c. A tungsten/rubidium filament

d. Ten thousand candles

For God and Country

In these troubled days there is a dangerous tendency among some in our country to accept the great principles embodied in our constitution as inalienable rights to which no devotion is owed or sacrifice due. Unbloodied youth demands its rights and forgets how dearly its privileges have been purchased.

Arlington Cemetery speaks to those who visit it of the fact that our Soldiers have purchased with their lives the freedom which we Americans hold. The stately rows of white marble headstones, framed by foliage and flowers and crowned by the Tomb of the Unknown Soldier, proclaim to all who see them that we the living must not squander our inheritance. We have a duty to preserve the freedom we have received, to enlarge and improve it when possible, and then transfer it safely to the next generation.

The words of Abraham Lincoln, although now a century old, are singularly appropriate today:

> **"It is for us, the living, rather, to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us; that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion; that we here highly resolve that these dead shall not have died in vain; that this nation, under God, shall have a new birth of freedom; and that government of the people, by the people, and for the people, shall not perish from the earth."**

Commanding General **LTG John Norton**
Information Officer **Col. George H. Hallanan Jr.**
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